

ZSCT's Thakur Shyamnarayan Degree College

Learning Outcomes

Department of Microbiology

Sr. No.	Course	Course Outcome	Program Outcome
Sem-I	Foundation Course-I	<p>Urban-rural disparities in access to health and education and fundamental rights.</p> <p>Gain an overview of significant soft skills required for addressing competition in market for jobs or starting own business or other career choices.</p>	
	Botany-I	<p>Unit.I Algae: Identify the different location of the algae.</p> <p>Explain their habitat, cell structure, pigments, reserve food found in them.</p> <p>Distinguish between the different forms of algae with example.</p> <p>Explain their reproduction types, differentiate between the three different types of syngamy.</p> <p>Explain the different types of alternation of generation with example.</p> <p>Write about economic importance of algae.</p> <p>Explain the classification, occurrence, structure, reproduction and life cycle of Nostoc and Spirogyra.</p> <p>Unit II Fungi: Explain the general characteristic of Phycomycetes ie. They will explain their location, anatomy, reproduction and alternation of generation.</p> <p>Write about the classification, occurrence, structure, reproduction life cycle of Rhizopus and Aspergillus.</p> <p>Know the benefits and Harmful effects of Fungi</p> <p>Explain the different mode of nutrition in fungi.</p> <p>Unit III Bryophyta: Differentiate between a moss and a liverwort.</p> <p>Explain the basic structure of Hepaticae ie. Know the geographical distribution, anatomy, reproduction and alternation of generation.</p> <p>Describe the habitat, anatomy, reproduction and life cycle of Riccia</p>	
	Botany-II	<p>Unit-I: Cell Biology: Understand Basic structure and differentiate between a prokaryotic and eukaryotic cell.</p> <p>Explain the structure and chemical composition of cell wall.</p> <p>Understand the functions of the cell wall.</p> <p>Analyze the chemical composition of cell membranes and different process involved in cell membrane.</p> <p>Describe the structural components of the cell membrane and their</p>	

		<p>function</p> <p>Explain the different models of cell membrane.</p> <p>Understand the structure and functions of Endoplasmic reticulum.</p> <p>Explain the ultra structure and function of Chloroplast.</p> <p>Unit-II: Ecology: Define ecology and ecosystems.</p> <p>Understand the components of ecosystems and their interaction.</p> <p>Explain concept of energy flow in the ecosystem and its different models.</p> <p>Identify and draw the food chain and food web.</p> <p>Define Aquatic ecosystem and explain its different types.</p> <p>Define terrestrial ecosystem explain its different types</p> <p>Unit III Genetics: Define genetic, heredity and variations</p> <p>Explain the concept of genotype and phenotype</p> <p>Understand the Mendelian genetics and Explain different laws.</p> <p>Understand the gene interaction with suitable example.</p> <p>Define epistatic and Non epistatic interaction.</p>	
	Microbiology-I USMB101	<p>development of Microbiology as a distinct branch of science.</p> <p>Biological hazards and safety measures.</p> <p>Structure and function of 2ukaryotic2 and 2ukaryotic cells.</p> <p>Classification, structure and function of macromolecules</p>	
	Microbiology-II USMB102	<p>principle, construction, working and application of different types of microscopes</p> <p>physical and chemical methods of control of microorganisms.</p> <p>Nutritional requirement, cultivation methods and preservation techniques for microorganisms</p>	
	Chemistry Interdisciplinary-1		
	Soft Skills And Personality Development -1		
Sem-II	Foundation Course-II	<p>Identify and understand the issues related to Human rights of the marginalized, ecology and science and technology</p> <p>Demonstrate creative thinking skills by time management, using team work and leadership skills.</p>	
	USBO 201 (Plant Diversity I)	<p>Unit-I Pteridophyta: Identify the different location of the plants belonging to Pteridophyta..</p> <p>Explain the classification, occurrence, structure, reproduction and life cycle of Nephrolepis.</p>	

		<p>Describe the stellar evolution.</p> <p>Unit II Gymnosperms: Explain the general characteristic of Gymnosperms.</p> <p>Write about the classification, occurrence, structure, reproduction life cycle Cycas.</p> <p>Explain the economic importance of gymnosperms.</p> <p>Unit III Angiosperms Understand the basic structure of leaf, its types and their modification.</p> <p>Describe the margin, shapes, apex and base of each leaf.</p> <p>Explain the basic structure of inflorescences and its types along with the modification.</p> <p>Describe in detail the plants belonging to family Malvaceae and Amaryllidaceae.</p>	
	<p>USBO 202 (Form and Function I)</p>	<p>Unit I Anatomy Understand Basic structure and types of each cell in the plant body</p> <p>To gain knowledge of plant cells, tissues and their functions.</p> <p>To make connections between plant anatomy and the other major disciplines of botany.</p> <p>To identify and compare structural differences among different taxa of vascular plants.</p> <p>Explain the structure and development of monocot and dicot root, stem and leaf.</p> <p>Unit II Physiology: Define Photosynthesis with its molecular reaction.</p> <p>Explain the Pigment System and its evolutionary significance. Mention different photosynthetic pigments and their organization in Pigment System.</p> <p>Describe the Role of main and accessory plant pigments in light trapping.</p> <p>Describe the photosynthetic light reaction i.e cyclic and non cyclic photophosphorylation. Explain of C3, C4 and CAM - cycle. Distinguish C3 -, C4 - and CAM pathways of CO2 fixation. Mechanism of C3 -, C4 - and CAM pathways and advantages of C4 and CAM over C3.</p> <p>Understand the significance of photosynthesis.</p> <p>Unit III Medicinal Botany: Define Medicinal Botany.</p> <p>Explain the concept of primary and secondary metabolites.</p> <p>Gives the different names of primary and secondary metabolites.</p> <p>Identify the different medicinal plants.</p> <p>Explain their active constituents and their therapeutic uses.</p>	

	Microbiology-I USMB201	the characteristics of different types of bacteria classification, morphology, cultivation, reproduction and significance of different groups of eucaryotic microorganisms	
	Microbiology-II USMB202	microbial interactions role of microorganisms in human health principle, construction, working and application of different instruments in microbiology	
Sem-III	USMB 301 Biomolecules and Microbial Taxonomy	principle and procedures of methods of estimation of various biomolecules nucleic acid structure, chemistry and function concepts of microbial taxonomy, classical and molecular methods of identification and classification of bacteria	
	USMB 302 Environmental Microbiology	importance of microorganisms in air, methods of sampling and studying air flora, air sanitation various fresh and marine water environments and significance of microorganisms present in them concept of potable water and methods of water purification microbiological analysis of water for potability methods of sewage water treatment and its monitoring importance of microorganisms in soil, methods of sampling and studying soil flora biogeochemical cycles bioremediation	
	USMB 303 Basic and Advanced Microbiology	basic information about cell structure, microscopy, staining, nutrition and cultivation physical and chemical methods of control of microorganisms techniques used in recombinant DNA technology Basic bioinformatics	
	FC-III	The learner will be able to understand the importance of RTI act and PIL, procedure to file such grievances. Develop scientific temper towards technology and its use in every day life. Appreciate the importance of developing a scientific temper towards Technology and its use in everyday life. Most important they will be able to understand the superstitions and myths associated in daily life. The learner will be able to understand the importance of RTI act and PIL, procedure to file such grievances.	

Sem-IV	USMB 401 Metabolism & Basic Analytical Techniques	metabolism, pathways, reactions, thermodynamics classification and properties of enzymes and co-enzymes, their kinetics, factors affecting principles, working and application of analytical techniques like chromatography, centrifugation and electrophoresis	
	USMB 402 Applied Microbiology	host defence mechanisms like physical and chemical barriers involved in innate immunity, cells of the immune system epidemiology - its tools, spread of infection and its control, nosocomial infections food as a substrate for microorganisms, factors affecting, general principles of food spoilage general principles of food preservation methods of microbial examination of foods microbiology of milk and milk products, their production	
	USMB 403 Advances & Applications Of Microbiology and Soft Skills	introduction, design, working and applications of biosensors, biofilms, and nanobiotechnology definition, characteristics, functions, classification of research basics of scientific writing and steps involved basics of biostatistics required for small scale research introduction, types, production and application of biopesticides, biofertilizers and bioremediation	

	FC-IV	<p>Acquire ability to apply skills required to address competition in career choices.</p> <p>Able to evaluate, synthesize and use information from different sources.</p> <p>Able to articulate their thought on social issues</p>	
1	Microbial Genetics (USMB-501)	<p>1. DNA Replication: The learner will understand the sequence of events, mechanism, enzymes and proteins involved in replication of DNA in prokaryotes and eukaryotes.</p> <p>2. Transcription, Genetic Code and Translation: The student will know the central dogma of biology its two-step transcription and translation, maturation of RNA.</p> <p>3. Mutation and DNA repair: The learner will know the concept of mutation, its types, causes and their effects. This module will also make them understand types of mutagens, damage to DNA due to mutagenesis, various mechanisms of DNA repair.</p> <p>4. Genetic exchange: The student shall understand the various mechanisms of gene transfer in bacteria and genetic recombination.</p> <p>5. Practicals: The students will acquire skill to perform the laboratory techniques and experiments based on the above topics.</p>	<p>At the end of the programme , the students will be able to • understand concepts in basic and applied microbiology • use relevant tools, instruments and equipments • develop observational and analytical skills necessary of interpret experiment/ projects • communicate scientifically • understand microbial life processes at molecular level • understand role of microorganisms in occurrence of disease and host defense • exploit microorganism for benefit of mankind and environmental sustenance</p>
2	Medical Microbiology & Immunology: Part-I (USMB-502)	<p>1. Give details of the virulence factors and other features of the pathogen.</p> <p>2. Correlate these virulence factors with the pathogenesis and clinical features of the disease.</p> <p>3. Comment on the mode of transmission, and therefore modes of prophylaxis of these Diseases</p> <p>4. Comment on the methods of diagnosis of the disease.</p>	

		<ol style="list-style-type: none"> 5. Conceptualize how the adaptive immune responses coordinate to fight invading pathogens and the organs and tissue involved 6. Discuss the role of antigen in initiating the immune response 7. Correlate the structure & functions of immunoglobulin 8. Understand the importance of cytokines, MHC, APCs, Cytokines, and the role in adaptive immunity. 9. Understand the various antigen –antibody reactions 	
3	Microbial Biochemistry: Part-I (USMB-503)	<ol style="list-style-type: none"> 1. Understand the architecture of the membrane and how solute is transported inside the cell. 2. Describe and explain the electron transport chains in prokaryotes and mitochondria and understand the mechanism of ATP synthesis. 3. Explain bioluminescence mechanism and its significance 4. Discuss the experimental aspect of studying catabolism and anabolism and the various pathways for the breakdown of carbohydrates along with reactions in amphibolic pathways. 5. Describe various other pathways which produce different end products. 6. Describe anabolic reactions in carbohydrate synthesis. 7. Apply the concepts of energetics and catabolism in biodegradation of various substrates. 	
4	Bioprocess Technology: Part-I (USMB-504)	<ol style="list-style-type: none"> 1. Describe the applications of microbes and its strain improvement in Industrial Microbiology. 2. Apply kinetic formula to determine growth and productivity parameters of batch continuous, fed batch and solid substrate fermentations 3. Describe the design of bioreactors for different applications and its process parameters 4. Design media, growth conditions and techniques for producing and recovering different types of products of commercial value. 5. Learner will be well –versed with the containment and levels of containment. 	
5	Applied Environmental Sciences Course code: USACEVS501	<ol style="list-style-type: none"> 1. Introduction to Environment and Pollution: Learner shall comprehend the impact of the interrelationship between various components of environment. Learner will apply the knowledge of pollutants to undertake research projects/studies. 2. Green chemistry and Sustainability: Learner would be critical and creative during the designing, manufacturing and utilization of chemical products, which would reduce or eliminate the use or generation of hazardous substances. 	

		<p>3. Alternate Energy Resources: Learner shall value the alternative energy resources and hence follow the 4 R's (Reduce, Reuse, Recycle & Reinvent). Learner may discover and design products, operations or processes, which conserve the energy resources.</p> <p>4. Neo Avenues: Learner will develop an acumen to tap the potential for entrepreneurship with respect to environment related products and indoor plants.</p>	
6	rDNA Technology, Bioinformatics & Virology (USMB-601)	<p>1. r DNA technology: This module will make the student understand the methods to construct recombinant DNA molecules, also know the tools required like vectors, restriction enzymes etc.</p> <p>2. Application of rDNA technology and Bioinformatics: The learner will know about applications of r DNA technology, through bioinformatics the student will understand the use of databases and software tools for understanding biological data.</p> <p>3. Gene Regulation and Basic Virology: The student will know about gene expression in prokaryotes, operon as a unit of gene regulation, regulation of gene expression in prokaryotes and bacteriophages. The student will also understand about general structure, life cycle and classification of viruses.</p> <p>4. Advanced Virology: The learner will understand the basic structure and life cycle of different viruses and their cultivation. The student will get basic knowledge on Prions, Virioids & viruses causing cancer.</p> <p>5. Practicals: The students will acquire skill to perform the laboratory techniques and experiments based on the above topics. The students will understand computational biology and insilico analytical techniques.</p>	
7	Medical Microbiology & Immunology: Part - II (USMB-602)	<p>1. Give details of the virulence factors and morphological and cultural features of the pathogen Correlate these virulence factors with the pathogenesis & clinical features of the disease.</p> <p>2. Comment on the mode of transmission, & modes of prophylaxis of these diseases given a few key clinical features, identify the likely causative agent.</p> <p>3. Comment on the methods of diagnosis of the disease.</p> <p>4. Understand the structure and role of T and B cells in generating adaptive immunity and thereby study effector responses in both Humoral & Cell Mediated Immunity Acquire an understanding of the role of immune system in disease:</p> <p>6. Understand the activation of complement system</p>	

		7. Apply the concept of immunity to prevention of disease by development of vaccines	
8	Microbial Biochemistry: Part-II (USMB-603)	<ol style="list-style-type: none"> 1. Metabolism of Lipids, Fatty acids, Nucleotides and Amino acids 2. Catabolism of Protein and aliphatic hydrocarbons 3. Regulation of metabolic process at various levels 4. Photosynthesis 5. Metabolism of inorganic molecules with special reference to nitrate and sulfate 6. Biological Nitrogen fixation 7. Lithotrophy <p>At the end of the course the learner will also acquire the following practical skills</p> <ol style="list-style-type: none"> 8. Screening of microorganisms producing lipase, PHB and protease 9. Detection of activity of enzymes which play an important role in amino acid and nitrate metabolism 10. Quantitative detection of important metabolic products such as protein and uric acid. 11. Quantitative detection of an important metabolic enzymes- protease 	
9	Bioprocess Technology: Part-II (USMB-604)	<ol style="list-style-type: none"> 1. Understand the actual process involved in fermentations of important products. 2. To apply the knowledge of applications of animal and plant tissue culture techniques. 3. Learn the applications of immobilized enzymes in various fields. 4. Understand the working of important instruments used in biochemical analysis and bioassay. 5. Learn the salient features of quality management and regulatory procedures. <p>At the end of the course the learner will also acquire the following practical skills</p> <ol style="list-style-type: none"> 6. Techniques involved in running a bioassay, immobilization of cells & sterility testing 7. Preliminary techniques in animal & plant tissue culture. 	
10	Theory Environmental Management Course code: USACEVS601	1. Business Analytics of Environmental Testing: Learner will gain knowledge about environmental testing and monitoring laboratories, air, water quality and noise exposure standards and methods of physico-chemical and bacteriological sampling. Learner will be exposed to the know-how regarding establishing environmental testing and monitoring	

	<p>laboratories.</p> <p>2. Ecological restoration: To focus the learner towards the immediate need to develop and practice the present and future systems, processes, technologies used for treatment of domestic waste water and industrial effluents. To seek and explore alternatives to conventional resources. Learner will study and comprehend the treatment practices applied for domestic waste water and industrial effluents. Learner will be equipped with the knowledge of some alternatives to conventional resources.</p> <p>3. Biodiversity Conservation & Ecotourism: Learner will develop aptitude to examine and assess the outcome of the framework of current biodiversity hotspots and biosphere reserves. Learner will be able to list the different aspects of wildlife photography and inspect the positive and negative aspects of it, also be able to recommend how wildlife photography can support biodiversity conservation. Learner will be able to assess the future challenges that ecotourism can generate for biodiversity conservation.</p> <p>4. Environmental Education & Legislation: Learner will imbibe positive changes in attitudes, commitments and civic actions required to combat harmful effects of anthropogenic activities and development on environment. Learner would inculcate ethical values and responsibilities towards protection of environment. Learner will be equipped to implement goals of environment protection.</p>	
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